

Dr. C. H. Desch read a paper, illustrated by lantern slides and specimens, on "The Origin of Agates". The most puzzling question in regard to agates was the parallel banding of the chalcedony of which they were chiefly composed. This had usually been regarded as representing successive flows of liquid containing gelatinous silica, which was deposited in thin layers on the walls of the cavity in which the agate was formed. Certain features common in agates were regarded as "tubes of entry" or "tubes of escape". In 1867 Ruskin had brought forward evidence to show that the banding was due rather to segregation in the solid state, but no theory as to the mechanism of the process could then be given. The work of Liesegang on rhythmical precipitation in gelatinous masses had led to the production of objects in which all the characteristic features of agates, including the "tubes of escape", were exactly imitated by processes of simple diffusion. It was not even necessary to assume precipitation. Slides were shown to prove that rhythmical crystallization, giving rise to a banded structure, could be observed even in pure substances. It was sufficient to assume a process of rhythmical crystallization in a mass of gelatinous silica to account for the banding and other characteristic features of agates.

OBITUARY.

C. T. CLOUGH,

M.A., LL.D., F.G.S., F.R.S.E., of Geological Survey of Great Britain.

BORN DECEMBER 23, 1852.

DIED AUGUST 27, 1916.

AN accident on the railway near Bo'ness has cut short the life of one of the most widely known and deeply respected of British geologists. Dr. Clough in the course of field-work in that district had occasion to cross the railway. Some mineral wagons were being shunted at the time and he tried to pass in front of them, but was run over. Immediate attention was given to him, first by the railway staff, and thereafter by the surgeons of Edinburgh Infirmary, to which he was sent by special train, but his injuries were very serious, involving double amputation, and after lingering for three days he died on Sunday, August 27, 1916. He was buried in Lasswade Churchyard on Wednesday, August 30.

Dr. Clough was 63 years of age. He joined the Geological Survey in March, 1875, at the age of 22, and after forty-one years was on the eve of retiring, but consented to remain on the staff to assist in meeting the pressure of work entailed by the absence on active service of most of the junior members of the Survey.

He was educated at Rugby, and at St. John's College, Cambridge, which he entered in October, 1871. He was awarded an exhibition in Natural Science from 1872 to 1874. In 1873 he obtained a first class in the May examination. In 1874 he received a first class in the Natural Science Tripos, being bracketed second with Herbert Carpenter, J. N. Langley, R. D. Roberts, and C. E. Shelly. He was elected a scholar in 1874-5, and took his B.A. in 1875 and his M.A. in 1878.

His first work on the Survey was done under the late H. H. Howell in the North of England. Teesdale, a district for which he preserved a lifelong affection, was the scene of his earliest field-work; and his first paper, printed in the Quarterly Journal of the Geological Society in 1876 (vol. xxxii), was on "The Section at the High Force, Teesdale". He continued in Northumberland and Durham for eight years, and the results of his work appeared in several Survey memoirs, including *Otterburn and Elsdon* (Sheet 108 S.E.) and *The English Side of the Cheviot Hills* (Sheet 108 N.E.).

In 1884 the one-inch map of England and Wales was completed, and Clough, along with Gunn, Barrow, and Hugh Miller, was transferred to Scotland. The survey of the North-West Highlands was then beginning, and Clough took part in it, but in the autumn and spring seasons he was engaged in surveying the Cowal district of Argyllshire. In Sutherlandshire he mapped a large district north of Loch Glencoul to Loch Inchard, and subsequently he executed the survey of an extensive area around Loch Maree. His description of that ground is contained in the Survey memoir on the North-West Highlands. When this was completed he worked in Glenelg, the north-east part of Skye, and Soay. About 1900 he was transferred to Strathcarron, Eastern Ross-shire. In 1902, on the death of W. Gunn, Clough became a District Geologist. He continued for a time in Ross-shire, and subsequently took charge of the work in northern Argyllshire and in Mull. In the spring and autumn seasons he was also employed on the revision of the coal-fields which was started in 1900. His first work of this description was in Haddingtonshire and the Lothians coal-field, and when that was completed he was transferred to Bo'ness. Subsequently he had charge of the revision of the Lanarkshire coal-field in the district south-east of Glasgow (Holytown, Motherwell, Airdrie), and finally he superintended the work in the North Ayrshire coal-field.

As time went on he exhibited a certain reluctance to publishing geological papers in the transactions of societies and in journals, and most of the results of his field-work appeared in Survey memoirs and maps. Of these perhaps the best known are the *Geology of Cowal* (1897), *Geology of the Neighbourhood of Edinburgh* (1910), *Geology of the Glasgow District* (1911), *Geology of Ben Wyvis* (1912), and the *Geology of Glenelg* (1910). At the time of his death he had two important memoirs on hand, viz. *The Economic Geology of the Central Coal-field of Scotland* and the *Geology of Mull*. Dr. Clough had contributed to thirteen Scottish and five English memoirs of the Geological Survey.

In field-work and the preparation of maps Dr. Clough found his principal interest. Office work and the writing of memoirs and scientific papers were more or less irksome to him. He combined to an extraordinary degree powers of minute observation, great diligence, and enthusiasm. His working day was always a very long one, and no difficulties arising from the complexity of the structural features of the ground assigned to him ever depressed him. In fact, he revelled in the mapping of intricate geology. Some of his field maps of the North-West Highlands, of Mull, and of Central Ayrshire may be

cited as examples of detailed mapping on the six-inch scale which, for thoroughness, have never been surpassed. He was a very judicious and impartial observer, and extremely cautious in drawing inferences. These qualities were especially valuable in mapping the Scottish coal-fields, where faulting and igneous intrusions play an important part. Mining engineers freely recognized Dr. Clough's pre-eminence in this class of work and placed great reliance on his opinion. The excellent training which he received from H. H. Howell no doubt laid the foundation of his eminence in field geology.

In the much debated questions of Highland geology and metamorphism Dr. Clough was intensely interested, and keenly alive to the importance of new discoveries. Yet he avoided speculation and declined to formulate general hypotheses till he felt sure the evidence was sufficient. Once convinced, however, he took up a well-defined position and was able to maintain it against all critics. His contributions to the memoir on Ben Wyvis shows a broad grasp of the problems involved. In later years he was a strong supporter of the interpretation of the structure of the Fort William country which was advanced by Bailey and Maufe. The important paper on the Cauldron Subsidence of Glencoe, which he wrote along with the two above-named geologists, had wide bearings on the tectonics of the Highlands. The still more difficult problems of the Tertiary Volcanic Rocks of Mull during the last years of his life deeply absorbed his attention.

He had a strong personality, which has left its stamp both on his work and on the men whom he trained in field geology, many of whom have attained distinction in scientific work. His watchwords were thoroughness and veracity, even in the minutest, apparently insignificant details. His habits were of extreme simplicity, and he was perfectly content with the rough food and simple life of a Highland shepherd's cottage. One of the most unassuming of men, he was never known to utter a harsh criticism, and he treated the opinions of even the youngest geologist with sincere respect. His gentleness, kindness of heart, and helpfulness earned him the affection of all with whom he came in contact. Questions of social reform attracted him strongly, though he paid little attention to politics as a whole.

Dr. Clough was a Fellow of the Royal Society of Edinburgh, and of the Geological Society of London, which, in 1906, awarded him the Murchison Medal. In July of the present year the University of St. Andrews conferred on him the honorary degree of LL.D. He was President of the Geological Society of Edinburgh from 1908 to 1910. He leaves a widow, two daughters, and a son, who is now in Canada and is serving with the R.A.M.C.

MISCELLANEOUS.

HUMAN SKELETON IN *GLACIAL* DEPOSITS, IPSWICH.¹

We have received the following letter published in the *Evening Star* and *East Anglian Daily Times* (dated October 14, 1916):—

¹ See GEOL. MAG., 1912, pp. 165, 187, 239, 287.